



Uninterruptible Power Systems

SDU Series
500, 850, 500-5, 850-5



Instruction Manual

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1.0 Important Safety Instructions

This manual contains important safety instructions that should be followed during the installation of the Uninterruptible Power System (UPS). Please read all safety, installation, and operating instructions before attempting to install or operate the UPS. Please adhere to all warnings on the unit and in this manual during installation and operation.

The UPS is designed for Industrial or Commercial use and can be installed and operated by individuals without previous training.

1.1 Safety Precautions—Warnings

- To prevent the risk of fire or electric shock, install the UPS in a temperature and humidity controlled ventilated enclosure, free of conductive contaminants, moisture, flammable liquids, gases, and corrosive substances.



- Operate the UPS only from a properly grounded (earthed) ac supply.
- To reduce the risk of electric shock, do not remove the cover, as it has no user-serviceable parts inside. Some components are live, even when ac power is disconnected. For service, contact a qualified technician.

Although your UPS has been designed and manufactured to assure personal safety, improper use can result in electrical shock or fire. To ensure safety, please observe the following rules:

- Turn OFF UPS and disconnect the ac supply before cleaning. Do not use liquid or aerosol cleaners. A dry cloth is recommended to remove dust from the surface of your UPS.
- Do not install or operate the UPS in or near water.
- Do not place the UPS on an unstable cart, stand, or table.
- Do not place the UPS under direct sunlight or close to heat-emitting sources.
- To allow proper ventilation of the UPS, do not block or cover the top and bottom sides of the unit.
- Never block or insert any objects into the ventilation holes or other openings of the UPS. Keep all vents free of dust accumulation that could restrict airflow.

- Follow all warnings and instructions marked on the UPS. Do not attempt to service the UPS, as it has no user-serviceable parts inside. Refer all repairs to qualified service personnel.
- Do not dispose of batteries in a fire; they may explode.
- Do not open or damage the battery. Released electrolyte is harmful to the skin and eyes and may be toxic.

If your UPS demonstrates any of the following conditions, turn OFF the UPS, disconnect the ac supply and contact your local distributor, SolaHD representative or SolaHD Technical Support at 1-800-377-4384.

- Liquid has been spilled on the UPS.
- The circuit breaker opens frequently.
- The UPS does not operate in accordance with the user manual.

1.2 Conditions of Use

Your UPS provides conditioned power to connected equipment. The maximum load must not exceed that shown on UPS rating label. If uncertain, contact your distributor or SolaHD Technical Support at 1-800-377-4384.

U.S. Only: For Conditions of Acceptability in accordance with UL 508A, see “13.0 Conditions for Safe Use of SDU 500 & 850”.

2.0 Warnings Defined

DANGER

Danger: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.

WARNING

Warning: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Caution: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

3.0 Introduction

Congratulations on your choice of the SDU Uninterruptible Power System (UPS). The SDU is a compact, "Off-Line" DIN rail mountable UPS, which provides conditioned power to sensitive electronic equipment. It supplies connected equipment with stepped approximation to sinewave power to simulate the power generated by the utility.

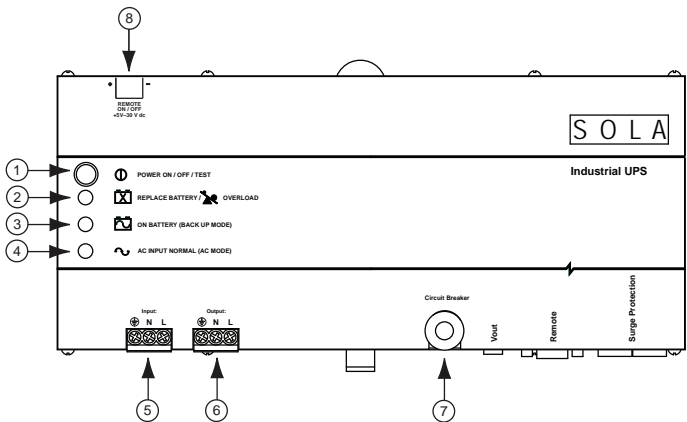
The SDU is a powerful, microprocessor-controlled UPS. Input voltage range is 80% to 110% (ideal protection for the critical connected loads). Battery charging occurs automatically when ac power is applied, no need to switch ON the UPS. When power fails, the UPS can be automatically turned OFF, as long as the connected loads are not operating to save the battery energy. The SDU also includes an automatic self-test feature to test the UPS function and battery. If the battery is no longer useful, the unit will sound an alarm and an LED indicator will illuminate.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in an industrial installation. This equipment uses, generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the UPS and the receiver.
- Connect the UPS into a circuit different from that which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

4.0 System Description

4.1 Front Panel

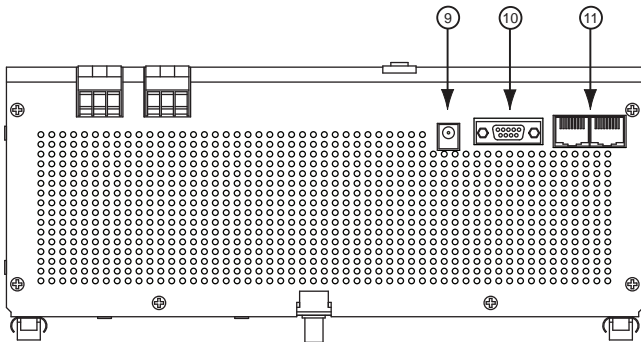


- 1. Power ON/OFF/Test Button:** Press the button for more than one second to turn the UPS ON. Press the button for less than one second to activate the self-testing. Press for more than five seconds to turn OFF.
- 2. Battery Warning/Overload Indicator (Red LED):** The LED flashes when the battery needs to be recharged and tested. The LED will illuminate when the unit is subjected to an overload condition. If the unit shuts down due to overload, the LED and alarm will continue for two minutes.
- 3. ON Battery Indicator (Yellow LED):** The LED illuminates when the UPS is supplying battery power to the loads.
- 4. Ac Input Normal Indicator (Green LED):** The LED illuminates when the line input voltage is normal.
- 5. IP20-rated Input Screw Terminals** (see table below)
- 6. IP20-rated Output Screw Terminals** (see table below)

Screw	M3.0; Current rating = 30 A, Ac 300 V
Insulation Withstands Volts	Ac 2000 V min.
PCB Hole Diameter	1.8 mm, wire strip length = 8 mm
Wire Range	10–24 AWG
Screw Torque	5.5 lb.-in.

- 7. Input Circuit Breaker:** Protection from ac overload and short circuit.
- 8. Remote ON/OFF:** The remote switch provides the same functions as the front panel switch including ON/OFF/Test functions with Green Mode enabled or disabled.

4.2 Bottom Panel



- 9. **V Output:** Output terminal providing 12 V power source to the optional relay card.
- 10. **Remote:** RS232 communication port; DB-9 connector.
- 11. **Tel/Surge Protection:** Data line surge protection for phones (UL497A).

4.3 What's Included

The SDU UPS is shipped with the following items:

- User manual
- UPSMON software CD

NOTE: Monitoring/diagnostic software is included on the UPSMON CD. The software is compatible with Windows NT and Windows 2000 (including XP operating systems).

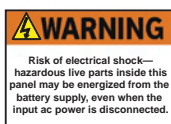
- UPSMON DB-9 serial cable
- RJ-11 cord
- Electrical shock warning label

4.4 Accessories

- **UPSMON-USB:** RS232 to USB adapter cable
- **RELAYCARD-SDU:** Dry contact relay box
- **SDU-PMBRK:** Mounting brackets to secure the UPS to the wall, back of the panel or enclosure

5.0 Installation Instructions

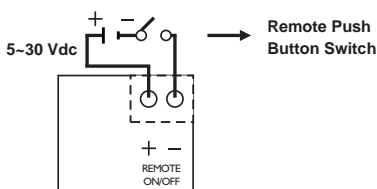
1. **Placement:** Install the UPS in a protected area with adequate airflow and free of excessive dust. Do not operate the UPS outdoors.
2. **Connect to Utility:** To power up the UPS, connect the ac input connector to the utility power.
3. **Charge the Battery:** The UPS charges its battery whenever it is connected to utility power. For best results, charge the battery for four hours during initial use.
4. **Connect the Loads:** Connect the loads to the output hardwire connector.
5. **Apply the Electrical Shock Warning Label:** Apply the electrical shock warning label to the panel, in a way that is clearly visible to the user.



6.0 Operating Instructions

1. **Output Connector:** The output connector will provide protection from surges and power failures to the critical loads.
2. **Switch ON Green Mode Enabled:** After connecting the UPS to the utility power, press the ON button until you hear the first beep, then release the button immediately. The Green Mode is enabled, i.e. if a load less than forty watts (or no load) is connected and the UPS operates in the Backup Mode. The UPS will enter into the Green Mode status after three minutes of backup time; the green light will flash every three to five seconds and after a short period of time; and the unit will enter a “power save” status by shutting down to prevent deep discharge of the battery. To reactivate the unit, power the unit OFF then ON again or reapply utility power.
3. **Switch ON Green Mode Disabled:** After connecting the UPS to the utility power, press the ON button and keep pressing it until you hear two short beeps “Bi-Bip”, then release the button immediately. The Green Mode is now disabled. Any kind of load, whether smaller than forty watts or larger, will not affect the normal operation of the UPS under Ac or Battery Mode.
4. **Switch OFF:** To switch OFF the UPS, press and hold the Power ON/OFF/Test button until the “Ac Power Normal” LED or “ON Battery” LED turns OFF.

5. **Self-test:** Use the self-test to verify both the operation of the UPS and the condition of the battery. In normal utility power, push the Power ON/OFF/Test button for less than one second; the UPS will perform a self-test. During the self-test, the UPS runs in Backup Mode. If the UPS passes the self-test, it returns to "Ac Input Normal" operation.
6. **Remote ON/OFF:** To ensure the remote ON/OFF function, connect a remote push-button switch in series with 5–30 V dc voltage source to the ON/OFF terminal as shown below.



The remote switch provides the same functions as the front panel switch including ON/OFF/Test functions with Green Mode enabled or disabled. If the Green Mode is not needed, a remote toggle switch can be used.

7.0 Battery Overload Alarms

1. **ON Battery (slow beeping):** When in ON Battery Mode, the yellow LED illuminates and the UPS sounds an audible alarm. The alarm stops when the UPS returns to Ac Input Normal operation.
2. **Low Battery (rapid beeping):** In ON Battery Mode when the battery energy runs low, the UPS beeps rapidly until the UPS shuts down from battery exhaustion or returns to Ac Input Normal operation.
3. **Overload (continuous alarm):** When the UPS is overloaded (the connected loads exceed the maximum rated capacity), the UPS sounds a continuous alarm and LED to warn of an overload condition. Reduce the load to eliminate the overload.

8.0 PIN-Out Configuration for DB9 Connector

Female Connector PIN No.	RS-232 Signal	Open Collector Signal
1	---	---
2	TX	---
3	RD	Remote shutdown*
4	DTR (+12 V)	---
5	GND	GND
6	---	Ac failure
7	RTS (-12 V)	---
8	---	Battery low
9	TX	---

DTR = Data terminal ready

RTS = Request to send

RD = Transmitted data

GND = Signal Ground

TX = Received data

*When a remote shutdown signal is applied for one second, the UPS will shut down in three minutes.

9.0 Battery Backup Times

	SDU 500, SDU 500-5	SDU 850, SDU 850-5
VA/Watts	500/300	850/510
Battery	YUASA NP7-12	YUASA REW45-12
Load Level	Backup Time (Minutes)	Backup Time (Minutes)
10%	130	80
20%	55	37
30%	36	20
40%	23	13
50%	18	10
60%	13	7
70%	10	5
80%	9	4
90%	6	3
100%	5	2.5

10.0 Troubleshooting

Problem	Probable Cause	Required Action
UPS is not ON; LED will not light	UPS is OFF or the ON/OFF/Test button was not pushed for 1+ seconds	Press the ON/OFF/Test button for more than 2 seconds
	Battery voltage is less than 10 V	Recharge the UPS for at least 4 hours. If the unit still does not start, check the input fuse.
	Other failure	Call SolaHD Technical Support
	Load is less than 20 W in Backup Mode	Normal condition
UPS is always in Backup Mode	Loose ac input power connection	Tighten the ac power connection
	Circuit breaker trips	Reset the breaker
	Line voltage too high, too low, or blackout	Normal condition
	Other failure	Call SolaHD Technical Support
Backup time is too short	Battery is not fully charged	Recharge the UPS for at least 4 hours
	Other failure	Call SolaHD Technical Support
Continuous beep & LED overload indication	Overload condition	Remove the overload
Red LED is flashing	Battery failure	Recharge the UPS for at least 8 hours. Perform UPS self-test.



CAUTION

Do not attempt to open the UPS or replace the battery. Call SolaHD Technical Support for further instructions.

11.0 Storage

11.1 Storage Conditions

Store the UPS covered and upright in a cool, dry location, with its battery fully charged. Before storing, charge the UPS for at least four hours. Remove any accessories in the accessory slot and disconnect any cables connected to the computer interface port to avoid unnecessary draining of the battery.

11.2 Extended Storage

During extended storage in environments where the ambient temperature is -15 to +30 °C (+5 to +86 °F), charge the UPS battery every six months.

During extended storage in environments where the ambient temperature is +30 to +45 °C (+86 to +113 °F), charge the UPS battery every three months.

12.0 Specifications

Description	Catalog Number			
	SDU 500	SDU 850	SDU 500-5	SDU 850-5
INPUT				
Capacity VA/Watts	500/300	850/510	500/300	850/510
Voltage (Single Phase)	120 V + 10%, -20%		230 V +/- 20%	
Frequency	50 or 60 Hz, +/- 10% (auto-sensing)			
OUTPUT				
Voltage (on battery)	Simulated sine wave			
	120 V +/-5%		230 V +/-5%	
Frequency (on battery)	50 or 60 Hz, +/-0.5% auto-sensing			
Transfer Time	<4 milliseconds			
PROTECTION				
Unit Input	Circuit breaker for overload and short circuit protection			
Overload Protection	UPS automatic shutdown if overload exceeds 105% of nominal at 20 s, 120% at 10 s, 130% at 3 s			
Short Circuit	UPS output cut off immediately			
BATTERY				
Type	Sealed, maintenance-free, lead acid batteries			
Typical Recharge Time (to 90% of full capacity)	8 hours			
Backup Time (at full load)	4 min.	2 min.	4 min.	2 min.
ALARM				
ON Battery	Slow beeping every 4 seconds			
Battery Low	Rapid beeping every second			
Overload	Continuous beeping sound			
ENVIRONMENT				
Ambient Operation	0–95% humidity, non-condensing, 50°C up to 10,000 ft. (3000 m).			
Audible Noise	<40 dBA (1 m from surface)			
WEIGHT & DIMENSIONS				
Net Weight, lb. (kg)	10.7 (4.7)	11.4 (5.0)	11.5 (5.2)	11.9 (5.4)
H x W x D, in. (mm)	4.88 x 11.1 x 4.55 (124 x 281 x 116)			
SAFETY/APPROVALS				
	UL 1778 C-UL Recognized* for industrial applications in accordance with UL 508A without derating. Overvoltage Category 3, Pollution Degree 3. FCC Part 15, Subpart B, Class A.		CE Marked: LVD: EN62040-1-1; EMC: EN50091-2, EN61000-3-2, EN61000-3-3, IEC801-2, IEC801-3, IEC801-4, IEC1000-2-2	



*For Conditions of Acceptability in accordance with UL 508A, see "13.0 Conditions for Safe Use of SDU 500 & 850".

13.0 Conditions for Safe Use of SDU 500 & 850

NOTE: Applicable for U.S. only.

Considerations shall be given to the following:

1. The equipment shall be installed in compliance with the enclosure, mounting, spacing, casualty, and segregation requirements of the ultimate application.
2. The equipment has been judged on the basis of the required spacings for use in Overvoltage Category III and Pollution Degree 3 and in the Second Edition of the Standard for Uninterruptible Power Supply Equipment, UL 1778, par. 23 and table 23.1, which would cover the component itself if submitted for unrestricted listing.
3. The suitability of grounding connection shall be determined in the end-use product.
4. The equipment is provided with means for permanent mounting, the suitability of assembly shall be determined in the end-use product.
5. Equipment is considered acceptable for use in a maximum ambient of 50°C.
6. The equipment inside live parts are energized from the battery supply even when the input ac power is disconnected.
7. For CNR investigation, total harmonic distortion of 44.8% and maximum single harmonic of 33.1%.
8. The equipment was investigated under 20 amperes branch circuit in accordance with the National Electrical Code, ANSI/NFPA 70, to reduce the risk of fire, connect only to a circuit provided with 20 amperes maximum branch circuit over current protection.
9. Use No. 18 AWG, 90°C copper wire and 9 lb.-in. Torque force when connecting to terminal block.
10. Polarity Identification in UPS unit for field wiring terminals: Provided with label adjacent to the unit supply connections. See below for details.

Input			Output		
	N	L		N	L

11. The following tests were additionally conducted at specified conditions as noted below, in accordance with the Standard for Industrial Control Equipment, UL 508A, 17th Edition.

Temperature Test: Models SDU 850 and SDU 500 were mounted in an enclosure (150% of the dimensions of the device, overall 420 by 180 by 160 mm), in accordance with par. 42.6 of UL 508A. The suitability usage of industrial control equipment shall be considered in end application.

Breakdown of Components Test: Model SDU 850 had been conducted through a 30-ampere non-time-delay fuse, in accordance with par. 57.5 of UL 508A.

12. **The products, Models SDU 850 and SDU 500 were evaluated based on Pollution Degree 3 and Overvoltage Category III criteria and a minimum end use ambient of 40°C, so that these devices do not have to be derated when installed within an industrial control panel.**

14.0 Product Registration & Warranty Information

14.1 Product Registration

To register your product for updates and information on service and support:

- Visit the Technical Support section of our Web site at:
<http://www.solahd.com/support/registration.htm>
- Click on the Product Registration link and fill in the form. This will register your product with SolaHD.

14.2 Warranty Information

Please see "Terms and Conditions of Sale".